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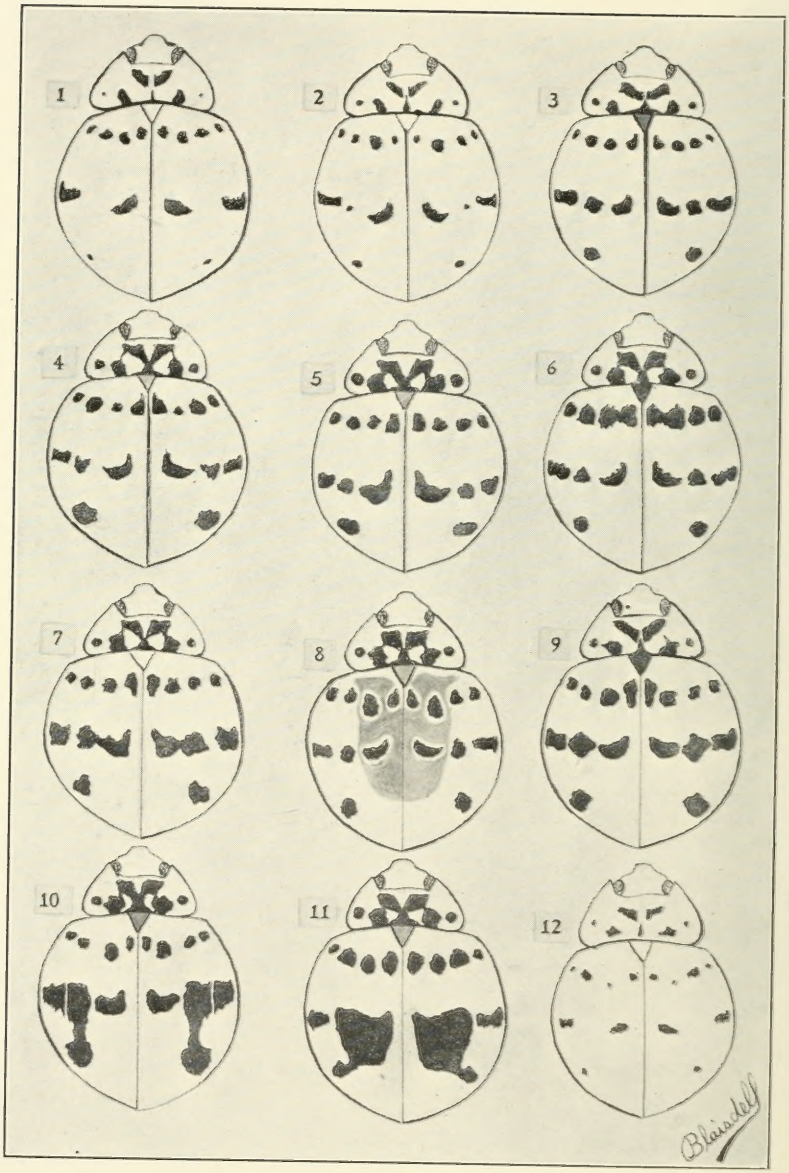

OLLA ABDOMINALIS—BLAISDELL.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXIV. NOVEMBER, 1913. No. 9.

CONTENTS:

Blaisdell—Variations in the Maculation of Olla abdominalis Say (Col., Coccinellidae) 385
Rau and Rau—Some Observations on Mud Wasps (Hymen.) 392
Alexander—The Neotropical Tipulidae in the Hungarian National Museum (Diptera)—I..... 404
A Hale and Hearty Entomologist..... 412
Crawford—Mexico Gulf Coast Citrus Fruit Association..... 412
Editorial—A Little Learning..... 413
Overman—Cystineura amymone (Lep.) 415
King George's Interest in Entomology 416
The Largest Living Insects (Orthop.) 416
Notice of Public Hearing on the Alligator Pear Weevil (Coleop.)..... 416
Entomological Literature 417
Review of Folsom's Entomology, Second Revised Edition..... 423
Review of Perkin's Introduction to the Fauna Hawaiiensis..... 424
Feldman Collecting Social (Lepid., Coleop., Hym.)..... 427
American Entomological Society (Orth., Lep., Dipt., Odon., Hym.)..... 430
Obituary—Herbert Druce..... 432
Dr. Auguste Puton..... 432
Prof. Fritz Wachtl..... 432
Dr. Paolo Magretti..... 432

Variations in the Maculation of Olla abdominalis Say (Coleop., Coccinellidae).

By FRANK E. BLAISDELL, SR., San Francisco, Cal.

(Plate XIII.)

The present paper is based on a study of the variations in the maculation found to be present in a series of 200 specimens of *Olla abdominalis*, collected on November 26, 1910, at Vine Hill, Contra Costa County, California.

At Vine Hill the meteorological conditions are moderate and "tully-fogs" are frequent.

The large series was collected from beneath the bark on eucalyptus trees. These coccinellids were there to hibernate through the winter, and the individuals were congregated in groups of from two to twelve. They never congregate in such immense masses as do the *Hippodamiae*. Usually there was one *Olla plagiata* Casey with each of the groups, irrespec-

tive of whether they were made up of two or more individuals. The latter species is the one formerly known as *Cycloneda oculata* Fab., a variety of *abdominalis* before Casey removed it from the genus *Cycloneda* and placed it in the genus *Olla*.

Colonel Casey, in his revision of the Coccinellidæ, states that the large series of *Olla abdominalis* studied by him exhibited an extremely small amount of variation, which, considering its geographical range, is very remarkable. The following descriptive notes are taken from his diagnosis of the species:

Upper surface pale brownish-yellow, *head* pale and immaculate. *Pronotum* with a basal black spot at two-fifths from the middle and a short transverse spot before the scutellum, also with two posteriorly converging black spots at the center and a narrow elongate spot on the median line joining the ante-scutellar spot and, at lateral eighth and basal third, a small rounded spot. *Scutellum* black in the male. *Elytra* each with a subbasal transverse series of four small black spots, a median series of three spots, the medial the largest and transversely crescentiform and, at apical fourth near the margin, another small rounded black spot. *Legs* and under surface pale.

After a careful study of the series under consideration, thirty-one specimens were selected out of the two hundred and arranged so that at one extreme they tended toward albinism and at the other toward melanism. By selecting and classifying the variations in elytral maculation, it was possible to arrange them in ten series, as follows:

Series 1, fig. 1.—Subbasal transverse series of elytral maculæ small and subequal; median* macula of the median series obsolete, the medial and lateral maculæ larger than those of the subbasal series, the medial scarcely crescentiform; subapical macula very minute. Pronotal maculæ all rather widely separated, lateral macula minute. Scutellum and sutural margins of the elytra pale. Under surface and legs rufo-testaceous, except the metasternum, which is rufous, and the meso- and met-episterna which are distinctively whitish, the small epimera apparently concolorous.

A companion specimen to the one from which fig. 1 was drawn, is identical with the above, but the meso- and met-episterna are white, the mes-epimera apparently rufo-fuscous, and the met-epimera are white; the metasternum rufous, laterally rufo-piceous, the first two

*Note.—The adjectival terms lateral, median and medial refer to the maculæ in a series on each elytron.

abdominal segments are rufous centrally and each has a piceous macula laterally.

Series 2, fig. 2.—In the subbasal transverse series of small spots the second from the suture is distinctly enlarged and slightly more extended posteriorly; median macula of the median series present and very small, medial macula distinctly crescentiform and narrower; subapical macula larger. Sutural margins of the elytra concolorous with the disc. Pronotal maculæ slightly less widely separated and the lateral macula larger. Under surface paler, as in the type of Series 1, except that the general color is more rufous and the side pieces scarcely whitish. Two companion specimens to the type of Series 2 are identical, except that the side pieces are more whitish.

Series 3, fig. 3.—Maculæ of the subbasal series larger and subequal; maculæ of the median series distinctly larger, the medial subcrescentiform, thicker and more irregular in outline, lateral macula slightly the largest. Pronotum with the posteriorly converging maculæ nearer together and almost connected with the narrow elongated macula which is continuous with the ante-scutellar macula. Edge of the sutural margin of each elytron very narrowly nigrescent.

Under surface as in the type of Series 2. Four companion specimens to the type of the present series, vary as follows:—One has the under surface the same, but the side pieces of the sterna are whitish; the second has the metasteruum and first two abdominal segments slightly piceous; the third has the metsternum nigro-piceous; the fourth is rufous beneath with the abdominal segments piceous centrally.

Series 4, fig. 4.—Medial and umbonal maculæ larger than in the type of Series 3; median series with the lateral and median maculæ slightly smaller, the medial thicker and more crescentiform; subapical macula distinctly larger and irregular. Pronotum with the maculæ narrowly connected, forming an irregular M-shaped figure; lateral maculæ larger and rounded. The mes- and met-episterna are whitish; metasternum and first two abdominal segments are rufopiceous, remaining segments gradually becoming rufous to the fifth.

Seven companion specimens to the present type are variable in the color of the under surface, metasternum nigro-piceous, or metasternum and first three abdominal segments nigro-piceous to rufopiceous, to entirely rufous; one specimen has the metasternum and four abdominal segments nigro-piceous, and the fifth segment rufopiceous; another specimen has the mes-epimera nigro-piceous.

Series 5, fig. 5—Maculæ of all the series larger and more subequal, the medial of the median series distinctly thicker and less evenly crescentiform. Pronotal M-shaped maculation larger and heavier, connectants thicker. Lateral macula no larger than in the type of Series

4, and the limit in size. The metasternum and abdominal segments piceous, the latter moderately narrowly rufo-piceous at the sides.

Three companion specimens have the under surface about as in the type of the present series, but the pronotal maculæ are more or less separated as in fig. 9.

Series 6, fig. 6.—Maculæ of the subbasal series distinctly heavier and more irregular, the medial two of each side coalescing; median series of maculæ slightly smaller than in the type of the preceding series and subequal, medial maculæ less crescentiform; subapical macula slightly smaller than in fig. 5. Pronotal M-shaped maculation slightly less heavy. Under surface pale rufous, with the sides of the metasternum rufo-piceous.

Series 7, fig. 7.—Maculæ of the subbasal series smaller, except the medial two; median series larger and more irregular, the medial and median of each side coalescing, the medial macula largest and more obtusangular; subapical macula large. Pronotal M-shaped maculation as in the type of Series 6, lateral macula smaller. Under surface pale as usual, with the sides of the metasternum slightly piceous. A companion specimen has the elytral subbasal series of maculæ distinctly larger and subequal, the sub-apical macula rounded and subequal to the largest.

Series 8, fig. 8.—The second macula on each side of the suture in the subbasal series is distinctly extended posteriorly, and the sutural macula slightly produced anteriorly, both subequal, similar in form and larger than the lateral two; median series of maculæ subequal in size and smaller than in type 7; subapical maculæ as in Series 7. Pronotal M-shaped maculation a little heavier than in Series 7, lateral macula as in Series 6. The metasternum is rufo-piceous, the abdominal segments slightly paler rufo-piceous, laterally and apically more or less rufous. A companion specimen is similarly colored.

General color of the elytra within an area as shaded in fig. 8, distinctly pale scarlet, enclosed maculæ are surrounded by a halo of the usual color. Several specimens in the original series had the entire elyra tinged with pale or obscure scarlet, the maculæ with or without a halo.

Series 9, fig. 9.—The medial macula of the subbasal series is slightly produced posteriorly, the series as a whole apparently straighter, size of the maculæ as in figs. 7 and 8; maculæ of the median series larger than in Series 8 and very narrowly separated from each other, the medial macula being as distant from the suture as in all the preceding series; subapical macula as in fig. 4. The pronotal M-shaped maculation dissolved, the medial maculæ very narrowly separated; lateral macula as in Series 7. Under surface of the type and two companion specimens dark, metasternum and abdomen nigro-piceous, terminal segment more or less rufous.

Series 10, fig. 10.—Maculæ of the subbasal series nearly as in Series 8; maculæ of the median series enlarged, the medial crescentiform, the lateral and median nearly coalescent, the median macula produced posteriorly and confluent with the subapical macula, the three forming an irregular figure-7 pattern. Pronotal M-shaped maculation again reconstructed as in Series 7 and 8. Under surface dark, as in Series 9.

Figure 11 is drawn from a specimen collected in Southern California, and kindly loaned to me by Dr. E. C. Van Dyke. The elytral maculation is self-explanatory after what has been said in the consideration of the preceding series. In the specimen the metasternum and abdomen are dark rufous, the central area of the abdomen is clear rufous. The mes- and met-episterna are distinctly whitish. The lateral macula of the median series nearly meets the marginal bead, the latter and sutural edge of the elytra are very narrowly piceous. The scutellum is fuscous. Two companion specimens collected at Old Fort Brown, Brownsville, Texas, on August 3d, 1906, by A. B. Wolcott and loaned to me by Mr. F. W. Nunenmacher, are quite identical in elytral maculation. In one specimen the under surface is rufous and the mestasternum is rufo-piceous. In the other one the metasternum is nigro-piceous and the general color darker rufous. In both the mes- and met-episterna and met-epimera are distinctly whitish, the white extending caudad along the sides of the first two abdominal segments, and more dilated on the first segment in one specimen than in the other.

The coxal lines in both are black and the enclosed coxal plate is rufo-piceous. In one specimen the front of the head is fuscous; in both the marginal and sutural edges of the elytra are dark as in Series 10. The scutellum is fuscous.

A careful re-examination of Type 10 clearly determines that the white of the sternal side pieces extends backward on the first two abdominal segments.

Mr. Nunenmacher informs me that these extreme dark forms are more common in Mexico. They are rare north of the Mexican boundary, at least as far as we know here on the Pacific coast.

Figure 12 illustrates an extreme pale form taken in Arizona, and it appears to be rare. The white of the sternal side pieces is distinct and its extension backward upon the abdomen is also evident.

The extension of the white upon the sides of the abdomen occurs sporadically in specimens collected at Mokelumne Hill,

Calaveras County, California, elevation 2,300 feet. A series of four specimens collected by Mr. G. R. Pilate, at El Centro, Imperial County, California, is to be referred to Series 1 and 2 of the present paper.

The material just discussed does not in any way elucidate the relation between *Olla abdominalis* and *Olla plagiata* Casey.

The above interesting series has caused considerable speculation as to the factors which act to bring about this variation in pigmentation. The normal tendency in *Olla abdominalis* is toward albinism.

I desire to mention the conclusions or theoretical suggestions of W. L. Tower, who made his studies on *Leptinotarsa* 10-*lineata*. His experiments extended over a period of eleven years, and his results have been published by the Carnegie Institution at Washington.

Tower believes that color production in insects is dependent on the action of a group of closely related enzymes, of which chitase, the agent which produces hardening of chitin, is the most important. He demonstrates by a series of well-planned experiments that colors are directly modified by the action of external agencies, namely: temperature, humidity, food, altitude and light. Food chiefly affects the subhypodermal colors of the larvae, and does not enter much into account, the most important agents affecting the adult coloration being *temperature* and *humidity*. A *slight increase* or a *slight decrease* of *temperature* or *humidity* was found to stimulate the action of the color-producing enzymes, giving a tendency to *melanism;* but a *large increase* or *large decrease* of *temperature* or *humidity* was found to inhibit the action of the enzymes, producing a strong tendency to *albinism*.

There seems to be no logical reason why we should not reason from analogy. Let it be granted that there is such an enzyme as chitase or its analogues present during the earlier stages in the ontogenesis of insects and that temperature and humidity can produce the optimum state for the activity of such enzymes, just as they do for other ferments, notably those for the conversion of proteids into peptones,

or starch into sugar; or that a similar environment excites activity in organized ferments. Biologists contend that environment plays a very important part in the variation of organisms, not only in the modification of coloration, but also in sculpturing.

It is important to emphasize the necessity of observing large series of insects and of keeping very careful and detailed records of the meteorological conditions attending their ontogenesis under natural conditions, in order to correlate the observed facts with analogous data obtained through experimentation in the laboratory.

The collecting of large numbers of coccinellids necessitates some rapid and effective way of cleansing them after removal from the cyanide bottle. It is well known that these beetles throw out secretions from glands situated in the sides of their bodies and from articulations, besides regurgitating the ingesta.

It is recommended that the entire catch of the specimens, few or many in number, be placed in a vial and that they be covered with chloroform and gently shaken for about one-half of a minute. That the chloroform be then poured off into another vial and the insects shaken out upon a sheet of blotting paper to permit of the evaporation of the chloroform. They will then be perfectly clean, bright and shining with colors and sculpturing fully cleared for study.

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Some Observations on Mud Wasps (Hymen.).

By Phil Rau and Nellie Rau, St. Louis, Missouri.

A Wasp and Her Spiders.

A *Pelopoeus** was building her nest on the wall of the room behind a dark curtain, and about five feet from the floor. I came in time, 5 P. M., June 23, to see her seal up the first cell. By 1.30 the next day the second cell was three-quarters done, and by 10 o'clock the following morning it too had been completed and sealed. For five hours I watched for this builder to return to add the third cell, but it was not until 3.55 that she returned, bringing a pellet of mud. She alighted upon a highly-colored cover of one of the current magazines which lay on a soap-box by the wall. From this landing she walked slowly but directly to the wall and then straight up the wall for about 12 inches until exactly even with the nest, then taking a horizontal course she walked toward the nest, but when about 6 inches from it she hesitated, made a circle of perhaps 1½ inches, hesitated again for a few seconds, then flew directly to the nest, made her deposit and immediately flew out again.

I removed the colored magazine cover upon which she had alighted when entering, thinking to confuse her. She returned after an absence of 30 minutes, but did not seem to miss her landmark, for when this was gone she alighted on the wall and went directly to the nest as before. By 4 o'clock the third cell was completed and the wasp was busy in carrying in spiders. While she was out hunting I removed four spiders from the nest of another wasp. They had the appearance of having been newly paralyzed. These I added to those already in the cell in order to find out whether the mother wasp could or could not recognize foreign prey. She returned with one spider, the booty of a half-hour's hunt, and flew to the nest with no difficulty, entered the cell, but left it immediately, buzzed around the room in one large circle and then back to the nest again, removed one of my spiders

* *Sceliphron* (*Pelopoeus*) *caementarium*.

and flew out of the window with it. She then removed the second and third and fourth spiders in precisely the same way.

She extracted the four foreign spiders and carried each one out of the window; why, pray, did she not drop them on the floor and spare herself the trouble of carrying them so far away? Having begun to carry out the foreigners, will she know when to stop, or will she blindly carry out her own victims as well? She returned and carried out a fifth spider by way of the window, then threw the sixth on the floor near the nest, while the seventh she dropped near the window sill. By this time her indignation had cooled sufficiently to permit thoughtful consideration, and for fifteen minutes she thrust her head in and out of the cell anxiously examining the contents, and finally flew away. I used this chance to examine the cell, and found that it was half packed with her own spiders.

Strange, strange creature! Since you commenced to remove the spiders, why did you not empty the cell? Could you distinguish your own victims from the intruders, and if so, why did you remove three of your own? Why, pray, did you not want the spiders which your sister had stung? They could not have differed much from your own, for if there had been a perceptible difference you would have stopped short with the fourth spider, and would not have carried off three of your own. Why did you spend a quarter of an hour in examining the contents of the cell after you removed the seventh spider, as if you were undecided whether you should leave the remainder?

It may be that in placing the four foreign spiders in the cell, the position of three of her own was disturbed in such a way that she, in all her wisdom, could not recognize them as her own. In examining the remaining spiders, I purposely disarranged them in the cell to see whether this would excite the same behavior. The returning mother was evidently much confused, for she spent two minutes by the watch, in packing them close together again and examining the cell very

minutely. Then she stood stock still at the entrance of the cell for nearly a minute before she would again enter it; then after examining the interior and the opening for five minutes more she flew away.

Since this mother *Pelopoeus* was so keen in recognizing spiders not of her own capture, an effort was made to determine whether she would recognize and remove an intruding larva of her own species if it were placed in her cell. Forthwith a five-day-old larva from another nest was placed in the cell, very near to the entrance. Now the wasps of this species never see any more than the egg of their young, since the egg does not hatch until after the nest is sealed. There is a vast difference between the egg of this wasp and a five-day larva,—such a difference that one would expect it to be taken for an enemy and removed at once.

The wasp returned, deposited the spider which she carried and flew away in the usual manner, paying no attention to the larva, even though she had to walk over it to deposit her load.

Shades of Moses! Good, healthy spiders that would have served as food for her young she removed just because she had no voice in the matter of their selection, and now she goes on supplying food for another mother's child, while her own will inevitably be starved, if not devoured, by this impostor!

I left the nest at 5 o'clock, and at 6 the next morning found that this cell had been sealed. I opened it and found that it contained 14 spiders. To the abdomen of one of these adhered her own larva, now 5 mm. in length. In addition to these, there was the large larva which we had placed there the day before, now almost a half inch in length and very fat. The wasp had the fourth cell half done when this, the third, was broken into during her absence, but she made no attempt to repair the broken cell. It seems that after a cell has once been sealed the interest therein is lost.

We remember the attitude of this insect toward the spiders taken from another wasp's nest and placed in her own. Now

we shall see the behavior of this very same wasp toward spiders removed from one of her own cells which had been sealed and placed in the cell now in the making. In the first experiment the borrowed spiders had been captured and handled by some other wasp. In this case they were taken by this very individual the day before and placed in a cell of the same nest. Will she carry these out as she did the others, or will she recognize them as her own brand?

The wasp returned, examined the inside and outside of the cell and nest for a half minute and then flew away, returning very soon with a spider which she tucked into the cell with the others without removing any of them, and with her head crowded and packed them into a compact mass. Soon it came with another spider, and while struggling to push it in it examined the entire nest carefully.

Since she did not remove her own spiders borrowed from yesterday's gathering, another attempt was made on this wasp to introduce spiders from another's nest. I removed the last one which she had brought in and substituted three others. This cell was now full to overflowing, twelve spiders from another cell of her own nest, three which she had captured for this particular cell, and three foreigners. She returned with another which she tried to cram in, but it fell to the floor. She then condensed the overflow by pounding and pushing them in with her head for exactly three minutes. She then soared out of the window and returned almost immediately with a pellet of mud which she spread over the entrance of the cell, and then another and another. If the insects are mere automata, as some writers would have us believe, why did not this one continue to bring in the spiders and try to crowd them into the cell until the usual quantity was reached? On the contrary, finding her cell full, she immediately packed it well and sealed it.

The item of interest is that the first time she removed the foreigners; then she left undisturbed the spiders of her own stinging, but from another cell; but on the third intrusion, when impostors were again introduced, she left them too un-

disturbed, but whether from ignorance or wise tolerance we do not know.

This cell also was opened to see if an egg had been deposited; it was discovered just as the mother wasp was coming with a load of mud. She was not observed that evening, but the next morning I expected to find the damaged cell repaired, but instead I found a new cell one-third completed, and no attention had been paid to the broken cell.

A Sleepy Eumenid.

A mud dauber's nest having several open cells, gave forth two wasps of the family Eumenidae* between 2 and 5 P. M. on May 31. Both of them occasionally took sweetened water from a wet cloth. At night, each crept into an empty cell of the nest, probably the one from which it had emerged. Up to 10 o'clock the next morning neither came out; a half hour later one was busily flying about the cage, and at 11 the other was doing the same. The remainder of the day they spent thus, and at 5 o'clock one of them retired into one of the two cells already mentioned, with its legs slightly protruding. Unfortunately, at 6.30 P. M. the second wasp escaped through an open window when the cage was lifted.

The interesting behavior of the remaining wasp was observed from day to day until its death on June 10. On June 2 it remained in the cell until noon, then came out and flew about until 2 P. M. and crept back into the nest again, always occupying the same cell. After three more days of this conduct, while the insect was out of the cell I placed a large drop of red jelly at the entrance. This must have confused the wasp, for it remained out all night, and the next day and night as well, and it was not until 4 P. M. of the third day that it retired into another empty cell (No. 2) at the far end of the nest. While I was examining the nest immediately after this, the wasp reappeared; at 4.30 the cage was made completely dark by placing a large box over it; when this was removed after twenty-five minutes the insect had retired into an untried

* Identified by Mr. S. A. Rohwer, through the kindness of Dr. L. O. Howard, as *Ancistrocerus unifasciatus* Sauss.

empty cell (No. 3), but it emerged again very soon after the cage became light. This experiment was repeated from 6 to 6.30, but the wasp could not be fooled into going to bed the second time.

The insect continued to use this cell (No. 3) for its retreat until 5 P. M., June 7. The next morning at 8, it was occupying cell No. 1, having migrated from No. 3 during the night; at 1.30 P. M. it was occupying No. 2. June 9 until noon it again occupied No. 1. It flew about all the afternoon and probably all night for the next morning it was still active. At 10 o'clock the insect and cage were placed in intense sunlight. By 11 the wasp cowered in the only shade that the cage afforded, that made by a small string tag bearing the cage number. This ticket was then removed to compel the insect to remain in the bright sunlight. It moved about slowly, however, and in forty minutes I found, to my surprise, that it was dead.

In keeping *Pelopoeus caementarium* of both sexes in confinement I have never observed them to enter their old cells, much less to remain there for hours.

A Wasp and her Nest.

A *Pelopoeus* (*Sceliphron* (*Pelopoeus*) *caementarium*) was discovered making her nest in an open soap box which stood on end partly facing an open window about three feet distant. Through this window the wasp made her entrance and exits. A roll of carpet on the floor extended into the box, barely touching the bottom, which now served as the back wall. On this wall just beneath the carpet was hidden the nest in course of construction, which now had two cells. The nest was first found by following the wasp. While the little builder was gone I pulled the carpet out about six inches. The carpet was undoubtedly associated in the wasp's mind with the location of the nest, for when she returned she was in an extremely confused state for about twenty-five minutes; much of this time she spent in examining the rug. It was necessary for me to leave without knowing whether she found the nest, but upon examining it two days later I found a third cell completed and the mother filling it with spiders.

I then removed the rug to a distance of two feet; when the wasp returned she flew through the window, alighting on the floor and then she walked directly into the box in a straight line and then up the back wall to the nest. In leaving, this insect would never fly directly off the nest and out the window, but would walk down the back of the box to the floor and then along the floor to the window.

I then laid a blue-covered book directly on the wasp's path in the box. The insect, entering in the usual way, walked around the edges of the book, hesitated for a few seconds at the farthest corner and then climbed up the wall directly to the nest.

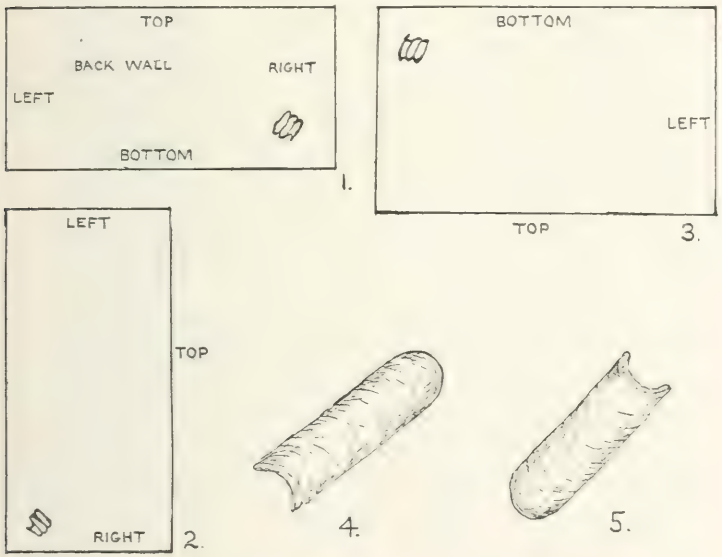
After she had again left we placed a large ball of colored yarn on the floor of the box, completely hiding the nest from view. The returning wasp paid no attention to this, but walked past and went into the nest. Perhaps she was becoming accustomed to being annoyed. This ball was removed after her departure, and the roll of carpet was placed midway between the window and the box directly over the insect's path, so that when she should return she must either walk around the roll or fly over it. The wasp entered and alighted on the floor near the window in the usual way, and then flew over the carpet and into the box containing the nest and up the wall as usual. It is interesting to note that previously the wasp had flown in from the window to the floor and walked the distance to the box; after the roll of carpet was placed upon its path it flew, entered as usual, and then made another flight to get over the carpet instead of walking over it.

After the wasp left, a brightly colored pillow was so placed in the box as to entirely hide the nest from view but not deny access to it. The returning insect was confused and made ten flights around the front and sides of the object, but when making these side trips it would invariably come to the front again, when by remaining at the sides it was nearer home, about twelve inches distant. The eleventh and longest flight brought the excited insect into its usual path on the walls of the box; then it had no trouble in going direct to the nest.

The insect, upon its next entrance required eight flights around this obstruction before it could find the back wall of the box, but after this was located, the nest was soon found.

After the wasp left again, everything to confuse it was removed and on its return it flew to the floor and walked to the nest in the old way.

Figure 1 shows the exact position of the nest in the box, just three inches from the floor. The box offered a convenient opportunity for attempting to confuse the builder by turning



the nest about. The box was therefore shifted about on the original spot so as to bring the nest into several different positions.

The box was first turned so that the right side became the bottom; this brought the nest into the position indicated in Figure 2. Originally the openings of the cells had pointed downward; this change brought the openings to face upward. and the nest which before had been on the right side of the box was now on the left.

Presently the wasp returned, walking up one side of the box

in the usual way, but soon perceiving that something was wrong, she flew around nervously in the box, then ran around on the bottom for a few seconds, and finally flew up to the nest, but she did not remain long there but flew in and out the box many times, each time alighting on the nest, always examining its bottom (in its former position the openings were at the bottom; now they were at the top). It seemed that she could not conceive of how the bottom had become sealed during her absence. This examination of the bottom she repeated eleven times. Then once more she flew to the nest and the hum which means work could be heard. She had at last found the opening of the unfinished cell and was now disposing of the pellet which she had carried during all this confusion. Upon leaving the nest this time the insect made a flight of orientation; on returning it flew in from the window to the floor, walked direct to the box, and then in uncertain lines to the nest, disposed of its pellet and this time left without a flight of orientation.

Again I moved the box to a position at right angles to the rays of light, instead of diagonal as heretofore, and so that the part marked bottom in Figure 1 was now the top. This made the position of the nest as shown in Figure 3. The insect returned, but this time it flew from the floor into the box in its new position, making three circles, each one smaller than the last, and then walked straight to the nest. Here she exhibited much confusion seeking for the spot on the unfinished cell where the pellet which she carried ought to be placed. Soon she left the nest in apparent anxiety or disgust and for fully two minutes she walked hither and thither about the box and then soared straight out the window. It was observed that when she departed she did not carry out the mud pellet, and an examination of the cell revealed a new layer of mud. I had not been keen enough to catch her at her nimble work. After one-half minute she returned with another pellet, this time making a bee line from the window to the nest as though she were fully accustomed to coming to the nest in this position. The next morning I found this cell completed but not sealed.

Figure 4 is the position of the cell when commenced, with the opening toward the light; Figure 5 gives the position in which it was finished, with the opening away from the direct source of light.

It is interesting to note that while the cell was begun on a downward slope, it was finished on an upward slope.

At 4 P. M. I found the mother filling this with spiders. I pulled the last spider out of the cell and deposited it just at the opening. The returning wasp entered at the window and after making a few circles it flew into the box and directly to the nest where with its head it pushed the protruding spider into the cell and deposited another, but it seemed just a little confused. Upon returning later in the afternoon I found that she had completed the cell and sealed it securely. I knew that if she should return now it would be for the purpose of adding other cells. To test her ability to repair any damage done to the cell I removed the soft covering which sealed it. It was now 5 P. M. and I left, but the next day I found that the damaged spot had been repaired and the fifth cell begun. Perhaps the wasp returned to add another cell to the nest and accidentally covered the opening without knowing that vandalism had been committed. Perhaps she realized that mischief had been done, for while I waited all day she never returned, and although I watched this nest from day to day for a week I found no evidence of new work, so I fully suspect that she had no desire to be crossed in her work.

Hungry Larvae.

A larva of *Trypoxylon albitarse* had completely exhausted the supply of spiders which had been provided for it, but had not yet made its cocoon. This gave an opportunity to see if a larva would eat more than the usual amount of food provided for it.

A large spider was removed from another nest and placed with this larva. Within six hours this had been devoured. Then two other large spiders were placed in the cell, and when an examination was made two days later it was found that the

larva had devoured one whole spider and half of the other and was now enclosed in its cocoon.

This simple experiment shows that this larva reached the limit of its capacity at two and-one-half additional spiders. This overfeeding was not injurious to the insect, because later it transformed into a normal adult.

The same experiment was carried on with another individual of the same species, which had eaten all of its food. At 9 P. M. on August 6, an additional large spider was introduced and commenced upon immediately, and by 7 the next morning it had entirely disappeared. A second large spider was eaten during the day and a third one was promptly pounced upon when it was introduced into the cell. The next day I found the larva had spun its cocoon, three-fourths of the last spider remaining. So this one was also able to increase its capacity to hold two and one-fourth spiders more than its original supply. It also eventually emerged as a normal adult.

David Sharp quotes Peckholt, who says, in speaking of this species*: ". . . however great may be the number of insects placed by the mother wasp in the cell, they are all consumed by the larva, none ever being found in the cells after the perfect insects escape therefrom."

That the larvae are greedy is substantiated by our observations, but our experiments demonstrate that there is a limit to their capacity, since both larvae pupated despite the fact that they could have gone on eating as long as I supplied the spiders.

Wasps Which Resented Intruders.

An Eumenid† nest (one cell) contained five small caterpillars. During the absence of the mother wasp, three spiders were taken from a *Pelopoeus* nest and placed in this cell. After two hours the wasp returned—two hours in search of a small green caterpillar. After hovering about the nest for a minute and a half she entered, but came out almost immediately, carrying one of the spiders and flew with it out of the window.

* Cambridge Nat. Hist., Insects, Pt. 2, p. 119.

† Probably same species as recorded on p. 396.

How far she carried it is not known, but she was gone for five minutes. The second spider, which was larger, must have caused more trouble, for the rear end of the wasp protruded from the cell as she tugged away at it, occasionally coming out entirely, but soon going back to again grapple with the impostor. After five-and-a-half minutes she succeeded in carrying it out of the nest, but did not fly out of the window with it this time, but dropped it to the floor very near to the nest. The wasp then went to work on the third spider, this one larger than either of the other two. After five minutes she succeeded in bringing it just to the entrance of the cell where, with only the least bit of effort it would have dropped to the floor, but instead of expending this last bit of energy the wasp flew away, straight out of the window. She did not return in an hour, but the next morning the spider was gone.

During the absence of the *Pelopoeus,* one-fourth of a match was broken off and placed in the open cell, partly protruding. The returning wasp buzzed nervously about for three minutes, examining the surrounding wall and cracks. One would almost suspect that she was deliberately seeking a location for a new nest, when suddenly she turned back to the cell, pulled the stick out with her jaws and dropped it to the floor. She evidently hesitated about entering, however, for she skeptically thrust her head into the cell several times and then left. During her absence a whole match was placed in the cell with more than half of its length protruding. After three minutes the wasp returned, flew wildly in all directions and circles about the room and dashed out the window, never to return.

Position of the Nests in Relation to the Light.

Whether wasps build their nests in any particular direction with relation to the source of light is difficult to discover, since the places which commonly harbor these nests usually have many sources of light. But we were fortunate in discovering eleven mud nests in an old corn crib which was lighted by only two small windows in the north wall.

The positions of the nests relative to the light were as follows:

4 nests (7, 2, 2 and 1 cells) facing north, toward light.
2 nests, (1 cell) facing south, away from light.
3 nests, (2, 2, 1 cells) facing west, partly away from light.
2 nests, (5 and 2 cells) facing east, partly toward light.

There were, then, six nests made facing the light and five with the openings away from the light.

In another room some 15 wasps were building behind the loose paper on the wall, almost, if not entirely, in complete darkness.

The Neotropical Tipulidae in the Hungarian National Museum (Diptera).—I.

By Charles P. Alexander, Ithaca, N. Y.*

(Plate XIV.)

Through the kindness of Dr. Coloman Kertesz, I have been able to examine and study the South and Central American crane flies in the collection of the Hungarian National Museum at Budapest. This collection of Tipulidæ, although not containing an unusual number of specimens, included a considerable number of interesting species which will be discussed in this and succeeding papers.

Subfamily LIMNOBINAE.

Tribe 1—Limnobini.

Genus **Dicranomyia** Stephens.

1829. *Dicranomyia* Stephens; Catal. Brit. Ins.; vol. 2, p. 243.

Dicranomyia subdola, sp. n. (Pl. XIV, Fig. 1).

Wings hyaline, veins of the wing margined with brown; tips of the femora yellow; abdomen annulated brown and yellow.

Female.—Length, 7.8 mm.; wing, 10.6 mm.

Rostrum and palpi dark brown; antennæ greyish brown, the flagellar segments much darker, brown; front, vertex and occiput greyish brown with numerous black hairs.

Pronotum brownish yellow, dark brown medially. Mesonotal præscu-

*Contribution from the Entomological Laboratory, Cornell University.

tum yellowish brown, a broad dark brown median stripe extending the length of the sclerite; scutum with the lobes brown, median space brighter, more yellowish; scutellum brown broadly margined with yellowish; postnotum dark brown. Pleuræ broadly dark brown becoming much lighter colored on the sternum. Halteres rather long, base of the stem pale, darkening into brown.

Legs, coxæ and trochanters light yellow, femora yellowish brown darkening toward the tip, the apex broadly yellow, tibiæ and tarsi brown.

Wings subhyaline, a brown quadrangular stigma, narrow brown seams along the cord, at the tip of *Sc* and along *Rs*, on the outer deflection of cell 1*st M2* and less distinctly along most of the longitudinal veins. Venation, (see plate XIV, fig. 1) *Sc*1 ending beyond the origin of *Rs*, *Sc2* also beyond *Rs*, its length about equal to *Sc*1, basal deflection of *Cu*1 about at the fork of *M*.

Abdomen, tergites with the basal half of each segment dark brown, the apical half abruptly yellow; sternites similar beyond the first segment.

Holotype, ♀, Callanga, Peru, in the Hungarian National Museum.

Closely related to *andicola* Alexander, of Bolivia (Can. Ent.; vol. 44, pp. 362, 363; pl. 11, fig. h), differing in the lack of lateral præscutal stripes, much more extensive brown pattern on the wings, position of Sc2, etc.

Dicranomyia tricincta, sp. n.

Wings with a reticulated pattern, a supernumerary cross vein in cell *R3*; femora with three subequal, equidistant brown rings.

Male.—Length, about 7-7.5 mm.; wing, 10.3 mm. Hind leg, femur, 8.8 mm.; tibia, 9 mm.; tarsus, 5.7 mm.

Closely related to *D. muscosa* End.[1] of Ecuador, differing as follows: Head rich brown without a yellowish tinge; legs with the femora light yellow with three broad equidistant brown bands, the first premedian, the second postmedian, the last subapical, these annulations occurring on all the legs, tibiæ a little darker at the tip, two terminal tarsal segments brownish. In *muscosa*, the legs are bright greenish yellow, the apical third of the femora yellowish, before the tip with a broad pale grey ring, tibiæ and tarsi bright brownish yellow. With *muscosa* it agrees in its irregularly reticulated wing pattern, presence of a supernumerary cross vein in cell *R3*, green cast to the body, etc.

Holotype, ♂, Callanga, Peru, in the Hungarian National Museum.

(1) Enderlein, Zool. Jahrbuch., vol. 32, pt. 1, pp. 75, 76, fig. W[1]; 1912.

Genus **Rhipidia** Meigen.

1818. *Rhipidia* Meigen, System. Beschr., vol. 1, p. 153.

Rhipidia domestica angustifrons Alexander (1912).

Alexander, Bull. Brook. Ent. Soc., vol. 8, pp. 16, 17; pl. 1, fig. ♀.

One ♀ from Callanga, Peru.

Rhipidia, sp.

One ♀ from San Bernardino, Paraguay. Fiebrig, 1908. It is allied to *domestica* but the antennæ are entirely lacking and closer identification is impossible.

Rhipidia, sp.

One ♀ from Asuncion, Paraguay. Vezényi, 1904.

Genus **Geranomyia** Haliday.

1833. *Geranomyia* Haliday; Entomol. Magaz., vol. 1, p. 154.

Geranomyia valida Loew. (Pl. XIV, Fig. 2).

1851. *Aporosa valida* Loew.; Linnæa Entomologica, vol. 5, p. 398.

One ♀, Concepcion, Chile, 1903; P. Herbst, coll.

A few additional details to Loew's characterization may be given. Proboscis split at tip, each lip recurved, the palpi very short and stout. Legs stout, coxæ, trochanters and femora yellowish, not darkened; tibiæ yellowish brown; tarsi, segments 1-3, brownish yellow, narrowly brownish at the tip of each, segments 4 and 5, brown. Wing venation (see plate XIV, fig. 2). Length, about 6.5 mm.; wing, 9.6 mm.; rostrum, 2.2 mm.

Geranomyia numenius, sp. n. (Pl. XIV, Fig. 3).

Rostrum long, thorax reddish brown, the præscutum with three pale vittæ and a dark brown median stripe; femora with a dark subapical ring; wings spotted, *Sc* long.

Female.—Length (excluding rostrum), 9.3 mm.; wing, 9.2 mm.; proboscis, 6.2 mm.

Proboscis dark brownish black; antennæ almost black, the flagellar segments elongate-cylindrical; front, vertex and occiput grey.

Pronotum light grey with a broad dark brown median vitta. Mesonotal præscutum rich reddish brown divided by three pale longitudinal whitish grey stripes, the median one broad and bisected by a narrow dark brown line which begins just behind the front margin of the sclerite and runs to the suture, the pale lateral vittæ narrow, enlarged at their anterior end before the pseudosutural fovea and run to the suture; scutum, scutellum and postnotum rich reddish brown, the latter with a paler median line. Pleuræ pale testaceous brown, darker

on the mesopleuræ, more greyish behind. Halteres, stem pale, knob brown.

Legs, coxæ and trochanters dull yellow, femora light brownish yellow with a rather broad subapical ring, tibiae light brown, the tip a little darker; tarsi brown.

Wings slightly infuscated with four brown marks along the costal region, the second at the origin of *Rs*, the third at the tip of *Sc*, the fourth at the stigma; pale greyish seams along the cord and along the outer end of cell *1st M2*. Venation (see plate XIV, fig. 3); *Sc* long, ending opposite or beyond the middle of *Rs; Sc2* equal to *Sc1*; *Rs* rather long, strongly arcuated at its origin. There is a supernumerary cross vein in cell *Sc* between the base of the wing and the origin of the sector, such a condition being rather frequent in this genus.

Abdominal tergites dark brown, stermites much paler, yellowish.

Holotype, ♀, Callanga, Peru.

Paratype, ♀, Callanga, Peru.

Types in the Hungarian National Museum.

The paratype lacks the blackish median præscutal vitta.

G. numenius is allied to *insignis* Loew (1), but the antennal flagellum is black, not brown; thorax without three clear opaque brownish black stripes, etc.

Geranomyia cinereinota, sp. n. (Pl. XIV, Fig. 4).

Rostrum short; thoracic notum grey with a well defined blackish median stripe; femora uniform in color, wings subhyaline.

Male, length (excluding rostrum), 5.1 mm.; wing, 6.8 mm.; rostrum, 1.8 mm. Female, length (excluding rostrum), 5.2 mm.; wing, 7 mm.

Male.—Proboscis short, scarcely extending beyond the wing basis, dark brownish; antennæ dark brown; head grey densely clothed with long, black hairs.

Cervical sclerites blackish with a little greyish bloom. Mesonotal præscutum grey with a broad brownish black median stripe, the sides of the sclerite darkened, almost black, the ground color brightest in front on either side of the median vitta, more suffused with brownish behind; scutum, scutellum and postnotum light grey. Pleuræ grey suffused with darker. Halteres short, yellowish, the knob brown.

Legs, coxæ and trochanters yellowish, femora dull yellow, tibiæ light brown, tarsi brown.

Wings subhyaline, iridescent, veins *C, Sc* and *R* more yellowish, remaining veins brown. Venation (see Plate XIV, fig. 4).

Abdominal tergites dark brown, sternites dull yellowish.

In the *female* the rostrum is even shorter, scarcely exceeding the antennæ in length.

1. Loew, H.—Linnæa Entomologica, vol. 5, p. 395, (1851).

Holotype, ♂, Coroico, Bolivia.

Allotype, ♀, with the type.

Paratypes, 40 ♂ ♀, Bartica, Brit. Guiana (H. S. Parish, coll.).

Types in the Hungarian National Museum; paratypes in author's collection.

G. cinereinota is allied to *diversa* O. S. of the Eastern U. S., but has a long *Sc.*, and a different thoracic- and wing-pattern.

Geranomyia scolopax, sp. n.

Rostrum short, barely exceeding the antennæ in length; thoracic notum greyish brown with dark brown stripes; legs uniform; wings hyaline with three brown costal spots.

Male.—Length, 5.3 mm.; wing, 7 mm.

Proboscis short, scarcely longer than the antennæ, dark brown; antennæ dark brownish black; head grey.

Mesothoracic præscutum greyish brown, with an ill-defined, darker median stripe and the lateral margin of the sclerite dark brown, this color being the continuation of the dark propleuræ, scutum dark brown; scutellum and postnotum a little lighter. Pleuræ light brown with a broad greyish brown band extending the length of the thorax above the base of the halteres and below the wing root, becoming confluent with the postnotum. Halteres pale, the knob a little brown.

Legs, coxæ and trochanters yellow, fore femora dull yellow, tibiæ and tarsi brown; middle and hind legs brown excepting the coxæ and trochanters which are yellow.

Wings hyaline, or nearly so, with a distinct oval, brown stigma, a brown cloud at the fork of *Sc* including the base of *Rs*, cell *Sc* with a brown cloud at one-half its length. Venation: *Sc* rather short, ending a little beyond the origin of *Rs; Sc2* at the tip of *Sc1*; basal deflection of *Cu1* at the fork of *M*.

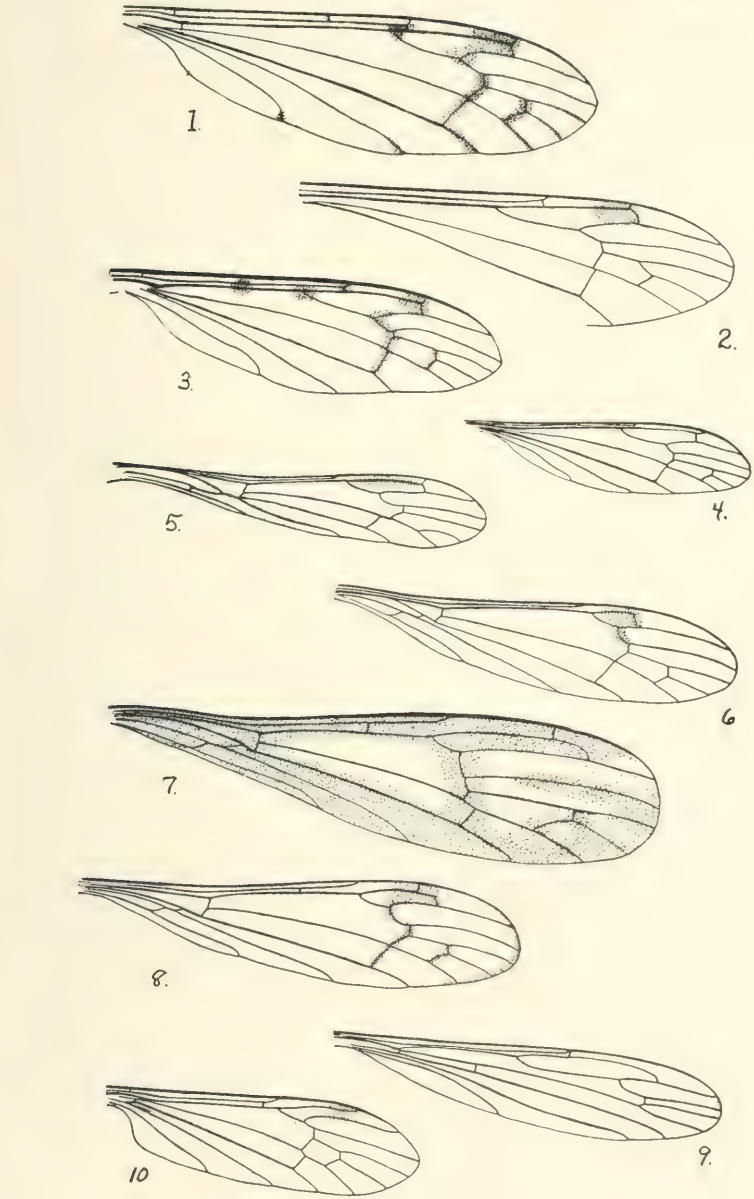
Abdominal tergites rich brown, the extreme base of each segment pale; the lateral edge and an indistinct median vitta brown; sternites brown.

Holotype, ♂, Callanga, Peru, in the Hungarian National Museum.

Closest to *cinereinota,* sp. n., but with distinct spots on the wing and with the median præscutal stripe ill-defined.

Genus **Peripheroptera** Schiner.

1866. *Peripheroptera* Schiner; Verh. Zool. bot. ges. Wien; vol. 16, p. 933.



NEOTROPICAL TIPULIDAE—ALEXANDER.

This remarkable genus of flies is apparently confined to the tropics of South America. Specimens are rare in collections and the few that have been taken are all contained in European museums. The peculiar characters of the genus, for the most part alar and venational, are thoroughly discussed by Osten Sacken in the second part of his "Studies on Tipulidæ" (Berl. Ent. Zeitschr., vol. 31, pp. 174-177). The present collection contained specimens of four species of which three are herein considered as new.

Key to the Species of Peripheroptera.

1. Cell 1*st M*2 open; [thorax black shining; inner end of cell *R*3 anterior to that of cell *R*5] (Brazil, Bolivia).
incommoda O. S. (1)
Cell 1*st M*2 closed, i. e., crossvein *m* present 2
2. Body color shining pitch black 3
Body color more or less reddish or yellowish 4
3. Inner ends of cells *R*3, *R*5 and 1*st M*2 about in a straight line; femora yellow basally darkening into brown at the tip. (South America) .....*aberrans* Schin. (2)
Inner ends of cells *R*3 and 1*st M*2 much farther proximad than the inner end of cell *R*5; legs black. (Peru).
teucholaboides sp. n.
4. Wings conspicuously margined with brown all around; a broad brown seam along the cord; [cell 1*st M*2 elongated; inner ends of cells *R*3, *R*5 and 1*st M*2 in a line.] (Peru).
cudorae sp. n.
Wings hyaline or suffused with yellowish; no distinct brown caudal margin to the wing 5
5. Inner ends of cells *R*3, *R*5 and 1*st M*2 nearly in a line. (Brazil).
schineri O. S. (3)
Inner ends of cells *R*3, *R*5 and 1*st M*2 not in a line, that of *R*5 being much farther distad 6
6. Abdomen entirely light brownish yellow; triangular basal cell (♀) very much shorter than cell *R*. (Peru)..*arcuata* sp. n.
Abdomen darkened toward the tip; triangular basal cell (♂ ♀) almost as long as cell *R*. (Colombia)....*nitens* Schin. (4)

(1) Osten Sacken, Berl. Ent. Zeitschr.; vol. 31, p. 176 (1887).
(2) Schiner, Novara Reise, Dipt, p. 43 (1868) (as *Rhamphidia*).
(3) Osten Sacken, Berl. Ent. Zeitschr.; vol. 31, p. 177 (1887).
(4) Schiner, Novara Reise, Dipt., p. 47, pl. 2, fig. 3 (1868) (type of the genus).

Peripheroptera incommoda Osten Sacken (Pl. XIV, Fig. 5).

One male from Coroico, Bolivia, agrees very well with the original description of this species. It measures 3.5 mm. in length of body and 5.4 mm. in wing length. I include a figure of its venation. (See Plate XIV, fig. 5).

Peripheroptera teucholaboides, sp. n. (Pl. XIV, Fig. 6).

Head dull brown; thorax shining black; wings hyaline with a small brown stigma.

Male.—Length, 4.8 mm.; wing, 6 mm.

Rostrum and palpi dark brown; antennæ dark brownish black, the flagellar segments short, rounded; front, vertex and occiput dull reddish brown.

Thoracic dorsum shining black; pleuræ black, with a bluish grey bloom on the mesopleuræ. Halteres brown, the base of the stem lighter.

Legs long and slender, entirely black.

Wings hyaline, a small dark brown stigma and a narrow seam of the same color on the deflection of *R* 4 plus 5; veins brown. Venation (see Plate XIV, fig. 6), triangular basal cell very short and small; *Sc*1 ends just before the origin of *Rs;* deflection of *R* 4 plus 5 a little shorter than *Rs* but strongly arcuated; inner end of cell *R*5 farther distad than those of *R*3 and 1*st M*2; basal deflection of *Cu*1 at fork of M. Anal angle of the wing feebly indicated.

Abdomen shiny black.

Holotype, ♂, Callanga, Peru, in the Hungarian National Museum.

P. teucholaboides bears a strong superficial resemblance to *Dicranomyia moriodes* O. S. (East. U. S.) and to certain of the tropical forms of *Teucholabis.* It is much nearer to the normal Limnobine type than any of the other known species of the genus in that the male venation and alar characters are about as in the females of the other species, i. e., small triangular basal cell, small stigma, indication of an anal angle to the wing, etc.

Peripheroptera eudorae, sp. n. (Pl. XIV, Fig. 7).

Thorax reddish; wings margined all around with brown, a broad brown seam along the cord.

Male.—Length, 5.4-6 mm.; wing, 8.2-10.1 mm.

Rostrum and palpi reddish brown; antennæ, first segment brown, remaining segments dark brownish black; front, vertex and occiput shiny reddish chestnut, the occiput rather narrowed caudad to meet the elongated cervical sclerites, genæ yellowish brown.

Pronotum shiny chestnut; mesonotal præscutum rich yellowish chestnut, very shiny, in front much darker, brownish, this brown mark ill-delimited; scutum reddish brown, blackened on the outer cephalic angles of the lobes; scutellum and postnotum liver brown. Pleuræ deep yellowish chestnut without markings. Halteres short, brown.

Legs, coxæ and trochanters brownish yellow, base of femora yellowish, soon darkened into brown, tibiæ and tarsi brown.

Wings, yellowish, with distinct brown markings, the whole margin of the wing is brown, rather interrupted at the distal ends of the radial cells where the yellow ground color continues to the wing margin; cord broadly margined with brown. The yellow color is distributed as follows: Most of cells *R* and *M*, tip of cell *2nd R*1, most of cell *R*3, basal half of *R*5, middle of *1st M*2, indistinct spots in the bases of *M*1 and *M*3, and a patch in cell *Cu*1. Venation: Costa strongly incrassated near the end of *Sc*1; *Sc*1 ends opposite the origin of *Rs; Rs* short, about equal to the deflection of *R* 4 plus 5; inner ends of cells *R*3, *R*5 and *1st M*2 in a line (see Plate XIV, fig. 7).

Abdominal segments almost black, each sclerite with a broad pale silvery apex.

Holotype, ♂, Callanga, Peru.

Paratype, ♂, Callanga, Peru.

Types in the Hungarian National Museum.

Peripheroptera arcuata, sp. n. (Pl. XIV, Fig. 8).

Thorax yellowish, a dark brown median mark on the præscutum, wings with the deflection of *R* 4 plus 5 strongly arcuated and not in a line with the inner end of cell *R*5.

Female.—Length, 5.6 mm.; wing, 6.8-7.8 mm.

Rostrum and palpi brown; antennæ, basal segments dull yellow, flagellar segments brown; front and vertex grey, this color continued caudad along the inner margin of the eye, caudal portions of the vertex and the occiput brownish yellow, head not shiny.

Thorax rich brownish yellow, a little shining, a conspicuous, elongate oval, dark brown stripe on the præscutum, this mark truncated in front, more pointed behind; scutum, scutellum and postnotum dull yellow, not shiny. Pleuræ dull yellow. Halteres light yellowish brown, knobs dark brown.

Legs, coxæ and trochanters light yellow, femora yellowish darkening into brown toward the tip, tibiæ and tarsi brownish.

Wings with a faint yellow tinge, most intense along cells *C* and *Sc;* stigma indistinct rather small, cord and tip of the wing very indistinctly suffused with brown. Venation (see Plate XIV, fig. 8), cross vein *r* angulated near its middle, strongly arcuated and with indications of a spur; *Rs* rather long, not so arcuated as the deflection of *R* 4 plus 5 which is bent almost at a right angle and is much proximad of the

inner end of cell R_5 though about on a line with the inner end of cell *1st M2*.

Abdomen brownish yellow without dark markings.

Holotype, ♀, Callanga, Peru.

Paratype, ♀, Callanga, Peru.

Types in the Hungarian National Museum.

EXPLANATION OF PLATE XIV.

Fig. 1. Wing of *Dicranomyia subdola* sp. n.; ♀.
Fig. 2. Wing of *Geranomyia valida* Loew.; ♀.
Fig. 3. Wing of *Geranomyia numenius* sp. n.; ♀.
Fig. 4. Wing of *Geranomyia cinereinota* sp. n.; ♂.
Fig. 5. Wing of *Peripheroptera incommoda* Osten Sacken; ♂.
Fig. 6. Wing of *Peripheroptera teucholaboides* sp. n.; ♂.
Fig. 7. Wing of *Peripheroptera eudorae* sp. n.; ♂.
Fig. 8. Wing of *Peripheroptera arcuata* sp. n.; ♀.
Fig. 9. Wing of *Diotrepha omissinervis* sp. n.; ♀.
Fig. 10. Wing of *Atarba varicornis* sp. n.; ♀.

A Hale and Hearty Entomologist.

On June 13, 1913, Hofrat Dr. Karl Brunner von Wattenwyl celebrated his ninetieth birthday in "voller geistiger Frische und körperlicher Rüstigkeit." On this occasion he was visited at Kirchdorf on the Krems, where he was spending the summer, by a deputation of his numerous friends, who presented him with addresses recalling his distinguished services in the organization of the telegraph in Austria and in the field of Orthopterology.—(*Wiener Ent. Zeitung*, July 15, 1913).

Mexico Gulf Coast Citrus Fruit Association.

I am sending you under separate cover a copy of the first circular of this Association, on the control of the Orange Maggot (*Trypeta ludens*—Dipt). We are conducting investigations on many problems relating to the culture of citrus fruits in the tropics and the subsequent circulars will treat of these various problems, which will be largely entomological, and some also on phytopathology, etc. I will be glad to send these to anybody who is especially interested in this work; especially in such cases as other bulletins or papers may be received in exchange.

I would be glad if you might make a mention of the above facts in the NEWS. We are devoting a great deal of attention to these matters and we believe that the results will be of interest to many outside of Mexico.—D. L. CRAWFORD, Entomologist and Horticulturist, P. O. Box 293, Tampico, Tamps., Mexico.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.—Ed.

PHILADELPHIA, PA., NOVEMBER, 1913.

A little learning is a dangerous thing:
Drink deep, or touch not the Pierian spring.

"San Jose Scale; a Parasite Which Kills the Orchard Pest is Found. Most Important Horticultural Discovery of Recent Years Officially Announced by State Zoologist. Certain That it Has Cleared up Orchards." The above appeared in the Philadelphia *Public Ledger*, September 26, 1913, and was followed by a detailed statement by Prof. H. A. Surface, Economic Zoologist of the Pennsylvania State Department of Agriculture. The discovery, according to Prof. Surface, has been pronounced the most remarkable horticultural work of years, if not of the entire decade. Dr. James S. Grim, instructor in the Kutztown (Penna.) State Normal School, claims that he discovered these parasites and sent them to Prof. Surface. All this has caused a wordy newspaper war between Prof. Surface and Dr. Grim as to priority of discovery.

A natural inference would be that a State Zoologist would look into the literature of the subject and have the specimens identified before rushing into print. There are numerous Hymenopterous parasites infesting the San Jose scale and a voluminous literature exists relating to the subject. Marlatt (in Bulletin 62, Division of Entomology, U. S. Dept. of Agri-

culture, 1906) mentions eight species as having been reared from the San Jose scale in this country. The literature of the subject practically dates from the description of the scale in 1880 by Professor Comstock. D. W. Coquillett reared *Aphelinus fuscipennis* Howard in California in the eighties. It was also reared by Ehrhorn, Craw and others in California years ago. In 1898 the late Prof. W. G. Johnson reared nearly four thousand specimens from scale found in Maryland. This species was also reared and studied a long time ago by John B. Smith in New Jersey and Prof. Forbes in Illinois. Girault reared *Aphelinus mytilaspidis* LeBaron in Washington, D. C., in 1905. *Aspidiotiphagus citrinus* Howard has been reared from the scale from Florida. *Physcus varicornis* Howard was reared by Prof. Quaintance in Florida, also in 1905. Quaintance and Girault also reared *Prospalta aurantii* and *Ablerus clisiocampae* Ashm. *Rhopoideus citrinus* Howard was reared in 1885 by Albert Koebele at Truckee, California.

This brief abstract from Mr. Marlatt's work shows that something was known of San Jose scale parasites before Prof. Surface made his marvelous discoveries in Pennsylvania. Of course it is possible that he or Dr. Grim has reared a new species, but even that will not excuse lack of reference to the literature, as there is no evidence that he knew what parasite or parasites he had.

The Pennsylvania State Zoologist appears also to claim priority in other things. In Press Bulletin No. 194, dated January 13, 1913, he says:

"Thoughtful readers of newspapers have been very much amused recently to see an article, apparently given out as a news item from Washington, D. C., to the effect that the U. S. Entomologist and his assistants, have recently discovered a means of destroying pests in buildings by fumigating with hydrocyanic gas.

"If such an idea is new to the Washington people it is an evidence that Pennsylvania is considerably ahead, as State Zoologist H. A. Surface has been publishing methods of fumigating buildings of various kinds for all insect pests during the past ten years.....the statement from Washington, that the entomologists there have discovered a method of doing such fumigation, appeals to our citizens either as a joke or as an echo from the rear."

We have heard the opinions of some citizens of Pennsylvania on this Bulletin and they appear to be uncertain whether it is a joke, a tragedy, or "an echo from the rear."

The Bulletins of the Division of Zoology of the Pennsylvania Department of Agriculture are copyrighted by Prof. H. A. Surface, Author. Why it is necessary to copyright compilations we can't imagine. Permission to publish extracts is given to all persons who will give proper credit of source. We avail ourselves of this privilege to quote from Bulletin No. 1, Vol. III:

The Bee-louse (*Braula caeca* Nitzsch)....It is a rather large, dark brown, wingless louse-like insect, possessing six legs, and belongs to the entomological order of Diptera or two-winged flies.

The Hog-louse (*Haematopius urinus* Nitzsch).....adults reaching to the length of an inch or more.

The adult carpet beetle is a minute, dark brown, oval insect.

The Book-lice....The adults are small insects with delicate wings and long antennae.

Under the heading "Chewing Insects" is placed the San Jose scale.

This is not the only bulletin in the series that makes interesting reading on account of the copyrighted original material in it.

There is opportunity for great improvement in the scientific output of this department in Pennsylvania, and such work seems to be overshadowed by an undue effort to gain newspaper and other notoriety. We regret to say that the standard of work in Economic Zoology in the great State of Pennsylvania does not compare favorably with what is done in a majority of the other States in the Union.—H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Cystineura amymone (Lepid.).

I note in the June number of the NEWS, page 279, records of the capture of *Cystineura amymone* from several localities in Oklahoma. In October, 1904, a single specimen was taken by me about a mile northwest of Lawrence, Kansas. The specimen seemed chilled and was unable to fly. It was given to the late Dr. F. H. Snow, who stated that it was the first that he had seen taken north of Texas.—C. I. OVERMAN, U. S. S. Supply, Guam, M. I., July 11, 1913.

King George's Interest in Entomology.

We note, with interest, in *The Entomologist,* for July, 1913, that at a recent meeting of the Entomological Society of London it was announced that H. M. the King had been pleased to become a patron of the Society. It is said to be "the first occasion when the Sovereign has demonstrated officially his interest in our branch of science and the work associated with it." We likewise "offer, therefore, our brother entomologists (across the seas), hearty congratulations upon the honor conferred on them."

The Largest Living Insects (Orthoptera).

Dr. Yngve Sjöstedt has recently described a new species of Phasmid, or Walking Stick, from Nyassa, East Africa, as *Palophus titan,* stating that it is the largest winged Orthopter yet known. The only specimen is a female having a body-length of 26.3 cm. (10 5-16 inches) and the hind wing 11.2 cm. (4⅜ inches) long. The front wing is very much smaller, 3-7 cm. (1 7-16 inches) in length. A life-size colored figure accompanies the description (in *Kungl. Svenska Vetenskapsakademiens Handlingar,* Band 50, No. 6, 1913) and shows the hind wings to be purple, banded and spotted with pale yellow. A table of comparative measurements of other Phasmidæ is given from which it appears that several wingless species exceed *Palophus titan* in body-length, the largest being *Phobaeticus kirbyi* Redt., of Borneo, and *Pharnacia serratipes* Gray, of Pulo-Penang, Malabar and Borneo, in both of which the body is 33 cm. (13 inches) long. These are the largest species of living insects, although the Protodonate *Meganeura monyi* Brongniart, of the Carboniferous of Saint-Etienne, France, had a body 35 cm. (13¾ inches) long and a wing-expanse of 64 cm. (25⅛ inches).

Notice of Public Hearing on the Alligator Pear Weevil (Coleop.).

The Department of Agriculture has information that a dangerous enemy of avocados (alligator pears), known as the avocado weevil (*Heilipus lauri*), exists in Hawaii, Porto Rico, Mexico and other foreign countries. Owing to the rapid increase of avocado culture in this country, and especially in California, there is grave danger of introducing this insect through the importation of seed, which may contain partly developed larvæ of this insect. The avocado weevil lives within the seed of the avocado and so far no thoroughly successful method is known of disinfecting or otherwise treating such seeds so as to kill the insect, without destroying the germinative vitality of the seed. It is hoped, however, that investigations now under way will discover an effective method of treatment under which importation of avocado seed can be permitted. In the meantime it is the duty of the Secretary of Agriculture to consider (in accordance with Sections 7 and 8 of the Plant Quarantine Act of August 20, 1912), the advisability of prohibiting the importation of avocado seeds and avocado fruits from all foreign countries in which this insect is known to occur.

In compliance with the Act, a public hearing will be held at the Department of Agriculture, Washington, D. C., at 10 o'clock on November 18, 1913, at which all persons interested, or their attorneys, may be present and have an opportunity to be heard concerning the establishment of a quarantine against all avocado seeds and avocado fruits coming to the continental United States.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted, always excepting those appearing in the January and February issues of the News, which are generally dated the year previous.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

1—Proceedings, Academy of Natural Sciences of Philadelphia. **3**—The American Naturalist. **4**—The Canadian Entomologist. **6**—Journal, New York Entomological Society. **7**—U. S. Department of Agriculture, Bureau of Entomology, Washington. **9**—The Entomologist, London. **10**—Nature, London. **11**—Annals and Magazine of Natural History, London. **13**—Comptes Rendus, Societe de Biologie, Paris. **21**—The Entomologist's Record, London. **22**—Zoologischer Anzeiger, Leipzig. **24**—Berliner Entomologische Zeitschrift. **34**—Proceedings, Iowa Academy of Sciences, Des Moines. **35**—Annales, Societe Entomologique de Belgique. **40**—Societas Entomologica, Zurich. **44**—Verhandlungen, K. k. zoologisch-botanischen Gesellschaft in Wien. **50**—Proceedings of the U. S. National Museum. **68**—Science, New York. **74**—Naturwissenschaftliche Wochenschrift, Berlin. **78**—Gardner's Chronicle, London. **79**—La Nature, Paris. **89**—Zoologische Jahrbucher, Jena. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **105**—Videnskabelige Meddelelser, Naturhistoriske Forening i Kjobenhaven. **119**—Archiv fur Naturgeschichte, Berlin. **142**—Report, Michigan Academy of Sciences, Lansing. **152**—California Agricultural Experiment Station, Berkeley. **153**—Bulletin, American Museum of Natural History, New York. **155**—Nova Acta Academiae Caesareae Leopoldius Carolinae Germanicae Naturae Curiosorum, Halle. **161**—Proceedings, Biological Society of Washington. **166**—Internationale Entomologische Zeitschrift, Guben. **182**—Revue Russe d'Entomologie, St. Petersburg. **186**—Journal of Economic Biology, London. **191**—Natur, Munchen. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **200**—Bulletin

Scientifique de la France et de Belgique, Paris. **216**—Entomologische Zeitschrift, Frankfurt a. M. **238**—Annales, Sociedad Cientifica Argentina, Buenos Aires. **240**—Maine Agricultural Experiment Station, Orono. **278**—Annales, Societe Zoologique Suisse et du Museum d'Histoire de Geneve, Revue Suisse de Zoologie. **279**—Jenaische Zeitschrift fur Naturwissenschaft. **303**—Entomologiske Meddelelser, udgivne af Entomologisk Forening, Copenhagen. **304**—Annals of the Carnegie Museum. **324**—Journal of Animal Behavior, Cambridge, Mass. **336**—Board of Agriculture, Trinidad. **340**—Transactions of the Linnean Society of London, 2nd Ser., Zoology. **341**—Archiv fur Rassen- u. Gesellschafts-Biologie, Leipzig. **364**—Biologica, Journal Scientifique du Medecin, Paris. **368**—The Monthly Bulletin of the State Commission of Horticulture, Sacramento, Cal. **369**—Entomologische Mitteilungen, Berlin-Dahlem. **373**—Contributions to the Natural History of the Lepidoptera of North America, by Wm. Barnes and J. H. McDunnough, Decatur, Ill. **394**—Parasitology, Cambridge, England. **405**—University of Toronto Studies, Biological Series. **420**—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington, D. C. **433**—Tennessee State Board of Entomology, Knoxville. **434**—Abhandlungen k. k. Zoolog.-Botanisch. Gesellschaft in Wien. **435**—Archives de Biologie, Liege and Paris. **436**—Annual Report and Transactions of the North Staffordshire Field Club. Stafford. **438**—Bulletin of the Illinois State Laboratory of Natural History, Urbana. **439**—Mississippi Agricultural Experiment Station, Agricultural College, Miss.

GENERAL SUBJECT. Ash, F. W.—The nature and origin of secondary sex characters, **436,** xlvii, 79-93. **Bervoets, R.**—Notes sur la circulation du sang dans les ailes des insectes, **35,** lvii, 184-190. **Breton, A.**—Insectoscope pour l'examen microscopique des objets en relief, **79,** 1913, 127-128. **Buchner, P.**—Neue erfahrungen ueber intrazellulare symbionten bei insekten, **74,** 1913, 401-406. **Caullery, M.**—Le probleme du determinisme du sexe, **364,** iii, 193-202. **Colthrup, C. W.**—Protective resemblance, **21,** 1913, 179-182 (cont.). **Cosens, A.**—A contribution to the morphology and biology of insect galls, **405,** No. 13, 297-387. **Dury, C.**—Insects that carry disease. 8 pp. (Extract from Lancet-Clinic, June 7, 1913.) **Govaerts, P.**—Recherches sur la structure de l'ovaire des insectes la differenciation de l'ovocyte et sa periode d'accroissement, **435,** xxviii, 347-445. **Imms, A. D.**—Contributions to a knowledge of the structure and biology of some Indian insects, **340,** xi, 167-195. **Merle, R.**—La chasse aux insectes, **79,** xli, 62-63. **Poche, F.**—Ueber drei antrage zur einschrankung der zahl der namensanderungen und zur abschaffung des liberum veto in der nomenklaturkommis-

sion...., **44,** lviii, 56-76. **Schmidt, H.**—Neue notizen zur besiedelung einheimischer pflanzen durch gallbildende insekten, **40,** xxviii, 59-60 (cont.). **Schroder, C.**—Handbuch der entomologie, Lief. 2-3, pp. 161-480 (cont.). **Stiles, C. W.**—Report of the International Commission of Zoological Nomenclature, **68,** 1913, 7-19. **Strindberg, H.**—Embryologische studien an insekten, **97,** cvi, 1-227. **Wheeler, G.**—The coloration problem. A rejoinder, **21,** 1913, 188-191.

Cockerell, T. D. A.—Some fossil insects from Florissant, Col., **4,** 1913, 229-233. **Smith, J. B.**—Report of the entomological department of the New Jersey Agric. College Exper. Station for 1911, 582 pp.

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Banks, N.—Notes on the types of some American spiders in European collections, **1,** 1913, 177-188. **Carl, J.**—Diplopodenstudien II. Eine neue Physiostreptiden-gattung, **22,** xlii, 212-216. **Emerton, J. H.**—New and rare spiders from within 50 miles of New York City, **153,** xxxii, 255-260. **Nuttall, G. H. F.**—(See also above.)

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das gehirn, die kopfnerven und die kopfdrusen des gemeinen ohrwurms (Forficula auricularia), **279,** l, 147-276. **Moewes, F.**—Die starrfurcht der indischen stabheuschrecken, **191,** 1913, 451-455.

Bruner, L.—South American locusts (Acrioidea), II, **304,** viii, 423-506. **Hebard, M.**—A revision of the sp. of the gen. "Nemobius" found in No. America north of the Isthmus of Panama, **1,** 1913, 394-492. **Rehn, J. A. G.**—A contribution to the knowledge of the O. of Argentina, **1,** 1913, 273-379.

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Barber, H. S.—The remarkable life-history of a new family (Micromalthidae) of beetles, **161,** xxvi, 185-190. **Bowditch, F. W.**—Descriptions of 3 n. sp. of "Lema" by the late M. Jacoby, and of a few other n. sp. of Criocerini, **9,** 1913, 238-44. **Bradley, J. C.**—"Physocnemum andreae" in Okefinokee swamp in Georgia, **6,** 1913, 159. **Csiki, E.**—Coleopterorum catalogus. Pars 54: Rhipiphoridae. 29 pp. **Kerremans, C.**—Monographie des Buprestides, VI, Livr. 10-12, 289-384 pp. **Kleine, R.**—Die geographische verbreitung der Ipiden genera orbis terrarum, **24,** 1912, 155-192 (cont.). **Lameere, A.**—Revision des Prionides. Pt. 1-2. 1052 pp. (Reprint from An. et Mem. Soc. Ent. Belgique.) **Leng, C.**—Note on "Phanaeus torrens," **6,** 1913, 157-158. **Lewis, G.**—On n. sp. of Histeridae and notices of others, **11,** xii, 81-87. **Pic, M.**—Coleopterorum catalogus. Pars 55: Bruchidae. 74 pp. **Roberts, C. H.**—Critical notes on the sp. of Halipidae of America, north of Mexico, with descriptions of n. sp., **6,** 1913, 91-123. **Sicard, D.**—Descriptions d'especes et varietes nouvelles de Coccinellides de la collection du Deutsches Entomologisches Museum de Berlin-Dahlem, **119,** 1912, Ab. A, H. 6, 129-138. **Woodruff, L. B.**—"Donacia emarginata": a biographic note. **4,** 1913, 210-11.

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Entomology with special reference to its biological and economic aspects. By Justus Watson Folsom, Sc.D., Assistant Professor of Entomology at the University of Illinois. Second Revised Edition. With four plates and 304 text-figures. Philadelphia: P. Blakiston's Son & Co., 1913. Price $2.25.

The second revised edition of this well and favorably known book appears as a thinner volume than the first edition. The size of the page remains the same, but the type form is 5/8 inch longer and 1/2 inch wider, so that, in spite of much additional matter, although with the omission of one chapter, the number of pages is reduced from vii + 485 to vii + 402. The paper is also a little thinner.

The numbering and titles of the chapters remain as in the first edition as far as Chapter VI and after Chapter X. Chapter VII of the first edition, "Origin of Adaptations and of Species," is omitted in the second. Chapter VIII, of the former, corresponds to No. VII of the latter. Chapter IX of the first, "Insects in Relation to Other Animals," is expanded into Chapters VIII and IX of the second edition, VIII having the same title as the former IX, while the new IX is "Transmission of Diseases by Insects."

Numerous additions to and revisions of the text have been made, as for example on pages 5 (on the new order Protura), 51, 85, 91, 104-5, 105-6, 117, 125, 165, 174, 187, 193, 198, 211, 269, 333, 336, 337, of the new edition, as compared with the corresponding passages of the old.

The interesting colored frontispiece of the first edition, illustrating Protective Mimicry among Butterflies, has gone. Text-figures 167 and

271-3 are new; fig. 205 is reduced from 204 of the first edition; the total number is thus greater by four. Some of these illustrations have suffered sadly in the printing, such as 15 (p. 9), 34 (p. 24), 199 (p. 123).

A few errors of the first edition have been carried over into the second, as the statement (p. 133) that the seventeen-year locust moults about twenty-five or thirty times, in spite of Marlatt's repeated assertion (1898, 1907) that the number is but six, and the use of "exuvia" for "exuviae," on the same page.

Additions have been made to each section of the very useful Bibliography at the end of the book, but the gaps between the dates corresponding to the appearance of the first and second editions, are usually marked and one feels that the author has not been able to observe a uniformity in his selection of titles worthy of inclusion. A noteworthy omission, both in the bibliography and in the text under Geological Distribution and under Interrelations of the Orders, is any reference to the comprehensive work of Handlirsch, *Die Fossile Insekten* (1906-08). Escherich's papers on Termites and especially his useful summary *Die Termiten* (1909) also should have been mentioned.

A notice of the first edition of Prof. Folsom's book was published in the NEWS for September, 1906 (vol. xvii, p. 226-3), and we reaffirm what was said there as to its excellence, even though we have been compelled to point out some minor defects in the new.—P. P. C. (*Advertisement*).

FAUNA HAWAIIENSIS, or the Zoology of the Sandwich (Hawaiian) Isles: Being Results of the Explorations instituted by the Joint Committee appointed by The Royal Society of London for Promoting Natural Knowledge and The British Association for the Advancement of Science and carried on with the assistance of those Bodies and of the Trustees of the Bernice Pauahi Bishop Museum at Honolulu. Edited by David Sharp, M.B., M.A., F.R.S., Secretary of the Committee, Cambridge. At the University Press. 4to., Vol. I, Part VI. PREFACE by the EDITOR, INTRODUCTORY ESSAY ON THE FAUNA by R. C. L. PERKINS, pp. I—CCXXVIII, 16 plates, January 15, 1913. (Rec'd at the Acad. Nat. Sci., Phila., July 7, 1913.)

Dr. Perkins began collecting in the Hawaiian Islands early in 1892. Three large volumes, now brought to a conclusion by his Introductory Essay, are chiefly based on the results of his field labors of twenty years and form a noble monument to his industry and interest. As may be seen from the titles of the parts of these volumes, listed below, the insects have come in for by far the major part of his attention. His highly interesting essay has the subtitle, "A Review of the Land Fauna of Hawaiia," and occupies 214 pages. It deals with the general fea-

tures of the islands, the general aspect of the flora and fauna, his methods of collecting; the number of species of insects, introduced, immigrant and endemic; causes of extinction, distribution by natural agencies, flightlessness; origin of the fauna and species formation. This general part of the introduction fills 59 pages, the remaining 155 being given to special reviews of the Hymenoptera, Coleoptera, Lepidoptera, Neuroptera, Embiidae, Termitidae, Psocidae, Odonata, Diptera, Hemiptera, Orthoptera, Thysanura, Collembola, Myriopoda, Arachnida, Mollusca and Vermes.

Notwithstanding the time devoted to these explorations, Dr. Perkins emphasizes our very unequal knowledge of the fauna, the Diptera, for example, being much behind the aculeate Hymenoptera. The total number of Hawaiian species of insects known to him "is about 3325, but of these only about 2740 can be considered as belonging to the natural fauna." He thinks "It is possible that half the number of existing species of insects have been collected, but this is by no means certain." These "islands are much richer in species than has been supposed and the scarcity of individuals of species exaggerated." (pp. xxxvii-xli).

The interrelations of the plants and insects are very intimate, as is shown by the fact that the endemic species are chiefly to be found in the true forest belt, which exists at elevations varying from 1200 to 3000 feet and whose two most characteristic members are the Koa (*Acacia koa*) and Ohia (*Metrosiderus*) trees. Much of the forest has been destroyed, largely by cattle, and with it much of the endemic fauna, but it is cheering to know that this loss is now being realized and measures taken to prevent its becoming total (pp. xxvii, xxx).

A very large number of Hawaiian insects have either one or both pairs of wings functionless for flight, or entirely wanting. Examples are known among the Lepidoptera, Diptera, Hymenoptera, Hemiptera, Neuroptera, Orthoptera and Coleoptera. Dr. Perkins believes that all these are "to be explained simply by 'disuse'" (pp. xlviii-lii).

His view of the present Hawaiian fauna is that it "cannot be said to belong to any of the great faunistic regions of the globe; it contains most important elements derived from the Oriental region, from the Australian and from the Neotropical or at least from the warmer parts of America, and it cannot be considered as even belonging chiefly to any one of these regions. On present information it is decidedly not Polynesian" (p. lxx). It "is derived from waifs and strays from all directions. At rare intervals from the Eocene till now chance immigrants have arrived. Some have been able to establish themselves, many more probably, even after a landing has been effected, have failed. Those that have been successful and have found congenial conditions have often thriven amazingly, giving rise to hosts of descendant species, as they have become adapted to, or become modified by, diverse conditions" (p. lx). Illustrations are the chalcid *Eupel-*

mus, 54 species, (pp. lxxvi, lxxviii), the Cerambycids *Clytarlus,* 14 spp., and *Plagithmysus,* 33 spp., the latter often mistaken by non-entomologists for crickets or grasshoppers (pp. cxvi-cxix), the Selidosemid moth *Scotorythra,* 34 spp., and its allies (p. cl), the Hemerobiid *Nesomicromus,* 22 spp., the Chrysopid *Anomalochrysa,* 29 spp., and the peculiar Odonata referred to *Agrion,* 26 spp., (p. clxxi). A fuller list is given on p. lii.

Although our author remarks: "The absence of gaily colored native butterflies or diurnal moths prevents the insects from making any conspicuous showing. It is doubtful whether to ordinary observers there is, excepting the fine *Pyrameis tammeamea,* a single insect that would be considered beautiful" (p. xxxi), the Hawaiian insects, nevertheless, present some interesting color-phenomena. Thus, the "general tendency to blackness of the Hawaiian Aculeata as a whole is one of their most remarkable features." The wasps of the genus *Odynerus* (s. l.), however, show many instances of conspicuous red or yellow markings. If they be divided up into a number of color groups, "these are entirely different from groups based on structure and real affinity. . .these color groups occur on each island and some of them, indeed, are only found on one of the islands" (p. xciii). Although this instance is similar to those commonly referred to mimicry, Dr. Perkins thinks that neither this nor any other explanation yet suggested is satisfactory.

Species of the moth *Scotorythra* mentioned above are sometimes present in immense numbers and their larvae, by defoliating the trees, suffer from famine. "Native birds attracted in thousands by the abundance of [the larvae], one of their favorite foods, were gorged to repletion, and the starving caterpillars formed writhing masses on the ground beneath the tall Koa trees. The dropping of excrement from the trees on the dead leaves beneath made a rattling noise as of a hailstorm" (p. cli).

"*Stegomyia fasciata* and *scutellaris* are well-known to all inhabitants as the 'day-mosquito'" and a case of yellow fever has been reported (p. clxxxi). The Sarcophagids *Dyscritomyia,* and *Prosthetochaeta* pass their larval stages in dead land Mollusca such as the famous Achatinellas (p. clxxxvi). There are no endemic Muscidae, but a number of foreign representatives (p. clxxxvii).

The majority of the Orthoptera are introduced, most of the native species being crickets, one of which (*Paratrigonidium*) is responsible for the song credited by the natives to *Achatinella* (p. ccxxv). The endemicity of the spiders is greater than that known in any other country (ccxi).

These scattered extracts will give some idea of the many interesting topics touched on and discussed in Dr. Perkins' Essay. The accompanying plates contain likenesses of Chas. R. Bishop, W. H. Flower,

Alfred Newton and F. D. Godman, associated with this work, relief maps of six of the Hawaiian islands, four landscapes and four colored plates of birds of the genus *Oreomyza*, of Orthoptera, Coleoptera and Hymenoptera discussed in the Introduction. Following is the list of contents of the whole work:

Vol. I. Part I. Hymenoptera Aculeata.—By R. C. L. Perkins and Auguste Forel, pp. 1-122, 2 pls., map. March 20, 1899. Part II. Macrolepidoptera.—By E. Meyrick, pp. 123-275, 5 pls. June 8, 1899. Part III. Hymenoptera Parasitica.—By W. H. Ashmead, pp. 277-364, 2 pls. August 1, 1901. Part IV. Vertebrata.—By R. C. L. Perkins, pp. 365-466. November 19, 1903. Part V. Microlepidoptera.—By Lord Walsingham, pp. 469-759, 16 pls. December 1, 1907.

Vol. II. Part I. Orthoptera.—By R. C. L. Perkins, pp. 1-30, 2 pls. August 19, 1899. Neuroptera.—By the same, pp. 31-89, 3 pls. September 25, 1899. Part III. Coleoptera I.—By D. Sharp and R. C. L. Perkins, pp. 91-270, 5 pls. February 8, 1900. Part IV. Mollusca.—By E. R. Sykes; Earthworms by F. E. Beddard; Entozoa by A. E. Shipley, pp. 271-441, 4 pls. May 19, 1900. Part V. Arachnida by E. Simon, Crustacea Isopoda by A. Dollfus, Crustacea Amphipoda by T. R. R. Stebbing, pp. 443-530, 7 pls. October 17, 1900. Part VI. Supplement to Hemiptera.—By G. W. Kirkaldy, to Hymenoptera, Orthoptera, Neuroptera and Diptera by R. C. L. Perkins, pp. 531-700. December 17, 1910.

Vol. III. Part I. Diptera.—By P. H. Grimshaw, pp. 1-77, 3 pls. December 30, 1901. Part II. Diptera (supplement) by the same and P. Speiser; Hemiptera by G. W. Kirkaldy, pp. 79-174, 2 pls. December 23, 1902. Part III. Coleoptera II.—By D. Sharp, pp. 175-292, 2 pls. April 9, 1903. Part IV. Thysanura and Myriopoda.—By F. Silvestri; Collembola by G. H. Carpenter, Mallophaga by V. L. Kellogg and B. L. Chapman; Arachnida (supplement) by E. Simon; Macrolepidoptera (supplement) by E. Meyrick, pp. 293-366, 5 pls. April 9, 1904. Part V. Coleoptera III.—By D. Sharp and H. Scott, pp. 367-579, 4 pls. December 18, 1908. Part VI. Coleoptera IV.—By R. C. L. Perkins, H. Scott and D. Sharp, Strepsiptera by R. C. L. Perkins; Thysanoptera by R. S. Bagnall; Acarina by N. D. F. Pearce, pp. 581-704, 3 pls. December 17, 1910.—P. P. C.

Doings of Societies.

FELDMAN COLLECTING SOCIAL.

Meeting of May 21st, 1913, at 1523 South Thirteenth Street, Philadelphia. Eleven members were present, President Haimbach in the chair.

Mr. Wenzel, Jr., said that on several trips to the Philadelphia Neck last fall all the Cecropia cocoons observed were

gathered. From these within the last month he had reared many parasites which include Diptera (*Tachina*) and several species of Hymenoptera; one species of the latter was hyperparasitized. The chrysalids of a species of moth had been found between the cocoons proper and the outer covering. These had also emerged and were identified by Mr. Haimbach as *Phlyctaenia tertialis* Guen.

Mr. Daecke exhibited his collection of Tortricidæ, which included Pennsylvania specimens of *Rhyacionia wenzeli* Kearf.

Mr. Wenzel exhibited a specimen of the beautiful *Carabus vietinghovi* Adams, from Alaska. Said he had been to Malaga, N. J., May 5, and had taken the usual spring forms, also five specimens of *Buprestis ultramarina* Say.

Mr. George M. Greene exhibited a specimen of the weevil, *Peritaxia hispida* Horn, from Cisco, Eastland County, Texas, September 21, '12 (altitude 1450-1550 feet), from the Rehn and Hebard material. This was fastened to a blade of grass by a silken band about the middle of the body, presumably by a spider. The back of the insect was towards the grass.

Dr. Castle said he had been to Pine Beach, New Jersey, but the weather was so cold that collecting was poor.

Mr. Kaeber said that *Lachnosterna* had been attracted to light in great numbers the evening of May 17th.

A paper was read from the April number of *Outdoor World and Recreation* on "The winter home of the Monarch Butterfly," by Lucia Shepardson. This was a very interesting account of the migration of this species, *Anosia plexippus*.

Adjourned to the annex.

Meeting of June 18, 1913, at 1523 South Thirteenth Street, Philadelphia. Eleven members were present, three visitors. President Haimbach in the chair.

Mr. Daecke exhibited a box of miscellaneous material collected by himself at Rockville, Pa., June 1, 1913, including 124 specimens of 75 species. He recorded a southern species of Lepidoptera, *Thecla m-album* Bd.-LeC., from Rockville, Pa., April 24, 1913.

Mr. George M. Greene exhibited two specimens of *Gnorimus maculosus* Knoch (Col.) from Overbrook, Pa., June 1, 1913, and June 15, 1913. These were taken accidentally (as all specimens of this species seem to be), one on a rail fence and the other on a cement walk. The only other specimen he had taken was on a doorstep, Philadelphia, May 8, 1894. Specimens of *Arotes amoenus* Cress. and *Ibalia maculipennis* Hald. (Hym.) were also shown. These were common on dead oak and beech, June 1 and June 15, 1913, in Overbrook woods. A specimen of *Calosoma frigidum* Kirby (Col.), Boonton, N. J., May 30, 1901, was also exhibited, all collected by himself.

Mr. Haimbach exhibited a box of moths which he had collected at night on his "farm" at Upper Roxborough. There were 305 specimens, of which 75 were taken in one night. These included the following which were specially pointed out to the members: *Acronycta*, 2 sp.; *Mamestra lorea* Guen., *Xylina laticinerea* Grt., *Erastria concinna macula* Guen. and var. *parvimaculata* Grt., *Nerice bidentata* Walk., *Hydriomena multiferata* Walk., *Anaplodes iridaria* Guen., *Erippe prunifoliella* Cham., *Tmetocera ocellana* Sch. and *Depressaria* sp.

Mr. Wenzel exhibited and recorded three species of *Lina* (Col.) which he said were very common on willow at Castle Rock, Pa., June 8; *L. tremulae* Fabr., *L. scripta* Fabr. and *L. lapponica* Linn.; the former was never recorded from this vicinity except as accidental. Other Coleoptera from the same locality and date were: *Anthaxia viridifrons* Lap., *Saperda imitans* Joutel, *S. discoidea* Fabr., *S. lateralis* Fabr. and *S. concolor* Le C. (the workings in willow of the latter were also shown). *Helluomorpha nigripennis* Dej., Malaga, N. J., May 25 (2 specimens) and *Helops gracilis* Bland, Da Costa, N. J., May 30.

Mr. Kaeber exhibited a specimen of *Cychrus viduus* Dej. (Col.) which he had collected at Castle Rock, Pa., June 1, 1913; *Gnorimus maculosus* Knoch, Media, Pa. May 24, *Cryptorhynchus parochus* Hbst., Media, May 24 (on oak), *Acanthoderus decipiens* Hald., South Philadelphia, June 15 (on

oak), *Xylotrechus colonus* Fabr., South Philadelphia, June 15 (on oak), *Elaphidion parallelum* Newm., South Philadelphia, June 15 (on oak) and *Bolboceras farctus* Fabr., Castle Rock, Pa., June 1, 1913. Also a specimen of Diptera: *Oncodes costatus* Loew, Castle Rock, Pa., June 1, 1913.

Adjourned to the annex.

GEORGE M. GREENE, *Secretary.*

AMERICAN ENTOMOLOGICAL SOCIETY.

Meeting of April 24, 1913. Dr. Philip P. Calvert, president, in the chair; seven persons were present.

Mr. Rehn made some remarks on the genus *Dichopetala* and exhibited the known species. The anatomical features of the species were pointed out in conjunction with their specific characters. They all live in thorny or tangled thickets. There are fourteen species, of which three were previously know and eleven are new. Of the old species, two types are in Vienna and one in Cambridge, Mass. Of the new forms, seven types are in Philadelphia, three in Cambridge and one in the American Museum of Natural History in New York. Of three of the new forms the only material was taken by Rehn and Hebard in 1912 and also a large series of three others. Seven species are Mexican only, five from the United States only and two from Mexico and the United States.

Dr. Calvert discussed the terms nymph, larva and pupa and considered their possible differentiation and limitations.

Mr. Williams exhibited some very interesting drawings of various European and exotic insects, purchased from a book dealer in London. They were the work of Petiver and others and dated from about 1809.

Mr. Laurent referred to an article on *Anosia plexippus* published in *The Outdoor World* for April, in relation to its habits of assembling and migrating and settling on pine trees at Pacific Grove, Cal. Mr. Rehn said the Monterey Peninsula was quite cold and that there are many warmer places in California, and why these butterflies select the place men-

tioned does not seem clear. Dr. Calvert suggested that a series of observations on these migrations should be made in the same way that the birds are studied.

Meeting of June 9, 1913. Dr. Philip P. Calvert, president, in the chair; eight persons were present.

Mr. Laurent said he had raised *Paratenodera sinensis* to see how many nymphs would be produced from each egg-mass. They produced as follows: 150 from the smallest and 300 from the largest. Each mass was kept in a separate box.

Mr. A. N. Caudell, of Washington, D. C., said *Stagmomantis carolina* varied greatly in abundance in the vicinity of Washington in different years. During some years it was quite difficult to find any specimens of this species. He referred to a small collection of Orthoptera made in north Peru, east of the Andes, and nearly all proved to be new. Another collection from just over the divide did not show nearly as many new forms. This shows a marked geographical barrier.

He also spoke of his method of keeping types in Riker mounts and explained its utility, and said the safety of the type preserved in this way appealed to him. Mr. Rehn said the thing one wished to see in a Riker mount was usually covered up. He also objected to cotton in contact with a dry specimen.

Mr. Rehn made some remarks on the geographical distribution of the genus *Arethaea*, nine species of which are found in the arid and semi-arid region of Texas. There is an isolated form found in Florida. He spoke of the comparative anatomy of the genus in relation to their systematic differentiation. The group characters were also explained.

Mr. E. T. Cresson, Jr., stated that Mr. E. G. Vanatta had reared *Scenopinus glabrifrons* from the Mediterranean Flour Moth, *Ephestia kuehniella*.

Dr. Calvert exhibited a female specimen of *Tetragoneuria* (Odonata) arrested in transformation, which he had found on a wooden post on the bank of the Rancocas Creek, above Mt. Holly, N. J., June 3, 1913. The wings of the right side were still partly within the wing-pads of the exuvia and so held the imago fast; the wings of the left side were free but not completely expanded. When found, the insect was able to move its legs and the left wings; the head, thorax and abdomen were well formed and well colored. Four ants, however, were engaged in feeding on the abdomen, so that only the first five segments were intact, the others being more or less destroyed. The ants were secured and had been com-

pared by the speaker with specimens in the Academy's collection determined by Professor Wheeler; they appeared to be *Formica schaufussi* Mayr. var. *incerta* Emery. Cases where Odonata have survived for some time the loss of terminal abdominal segments have been previously recorded, as for example, by the speaker in the *Transactions* of this Society, Vol. xx, p. 193. The present observation is also of interest in recalling another source of danger to which these insects are exposed at the critical period of metamorphosis.

Dr. Calvert also exhibited about two hundred Coleoptera which he had incidentally picked up in Costa Rica.

HENRY SKINNER, *Secretary.*

OBITUARY.

HERBERT DRUCE.

The death of Mr. Herbert Druce was announced at the May (1913) meeting of the Entomological Society of London. He was born July 14, 1846, and is chiefly known as the author of the section *Lepidoptera Heterocera* (excluding the micros) of the *Biologia Centrali-Americana,* two volumes of text and one of plates, published 1881-1900, enumerating 3,639 species. Brief obituary notices appeared in *The Entomologist* for June, 1913, and *The Entomologist's Record* for June 15. The disposition of his collections was mentioned in the NEWS for October, page 374.

DR. AUGUSTE PUTON.

Dr. Auguste Puton, author of works on the Hemiptera, member of the Entomological Society of France since 1856 and the dean of its honorary members, died at Remiremont April 8, 1913. (*Bull. Soc. Ent. France,* 1913, No. 8.)

PROF. FRITZ WACHTL.

Fritz Wachtl, one of the five founders of the *Wiener Entomologische Zeitung* and for nineteen years an editor thereof, died March 4, 1913. Born in Breitau, Moravia, July 18, 1840, he entered the forestry service and became Professor of Forest Conservation and Forest Entomology in the Agricultural High School in Vienna in 1895. His entomological publications, which are listed in a biographical notice in the *Zeitung* for July 15, 1913, (xxxii, 7-9), dealt largely with forest insects.

DR. PAOLO MAGRETTI.

The death of this Hymenopterist at Cascina Amata di Paderno Dugnano, Italy, on August 30, 1913, is announced.

EXCHANGES.

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☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued

For Sale or Exchange—Insects of all orders—local and foreign. Send list of desiderata, or ask for my lists of the different orders.—Harry Johnson, So. Meriden, Conn.

Wanted—Will pay cash for *Marumba modesta* pupa. I have for exchange perfect specimens of Lepidoptera, cocoons and pupae from this locality.—Ernst Frensch, Stonington, Conn.

Exchange—Lepidoptera in papers from this locality in exchange for others. Send for list of duplicates.—Edwin P. Meiners, 2624 N. Garrison Ave., St. Louis, Mo

Will give Coleoptera from my locality in exchange for Carabidae, *Trechus* and *Anophthalmus*, etc., in large numbers.—Adolph Mares, 2517 So Homan Ave., Chicago, Ill.

I want offers of exchange with collectors of North American Lepidoptera. No exotics. I offer pinned specimens only, and prefer such in return.—John L. Healy, 1516 Birchwood Ave , Chicago, Ill.

Wanted—Imagoes of *Catocala marmorata* and *sappho*. Have for exchange eggs of *Catocala retecta, residua, vidua, cara, innubens, ilia, nubilis, neogama, palaeogama, polygama, scintillans, habilis*, imagoes of *Catocala*, and pupae of *Sphinx ophthalmicus*.—R. R. Rowley, Louisiana, Mo.

I have fertile eggs of the great Indian leaf insect *Pulchryphyllum crurifolium* to hatch in spring, and live cocoons and papered imagines of many hybrids and rare species of old world Saturnids. Desiderata West Coast Saturnids and *Parnassius eversmanni* and forms of *clodius*.—J. Henry Watson, 70 Ashford Road, Withington, Manchester, Eng.

Pupae of *Catocala nubilis, Actias luna, H. io, A. cynthia* and pinned or papered specimens of *C. angulifera* and many *Catocalae* to exchange.—John H. West, 2057 E. York St., Phila , Pa.

Wanted for cash—Mounted North American Butterflies and Moths in perfect condition, with exact locality. Send list of duplicates with prices.—The Kny-Scheerer Co., Department of Natural Sciences, 404-410 West 27th St., New York.

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Wanted—For cash, fertile eggs, blown larvae and imagines of *Catocalae* of the U. S. Fertile eggs of *C. badia* and *C. muliercula* in particular.—Geo. J. Keller, 191 Avon Ave., Newark, N. J.

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Cicindela modesta in exchange for N. A. Coleoptera. Send list of not more than twenty species that you have to offer.—Philip Laurent, 31 East Mt. Airy Ave., Phila., Pa.

Photographs of Entomologists Desired.

The Entomological Section of the Philadelphia Academy of Natural Sciences desires for its entomological album the photograph of every entomological student. The collection contains over 300 at this date. A list was published in the NEWS 1902, pages 45-47, of those in the album at that time. We hope that those who can do so will write their names and date of birth and the date when the photograph was taken on the back of each photo, along with any other information concerning themselves they may wish to impart.

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